LII. *Obfervations upon the Comet that appeared in the Months of* September *and* October 1757, *made at the Royal Obfervatory by* Ja. Bradley, *D. D. Aftronomer Royal, F. R. S. and Member of the Royal Academy of Sciences at* Paris.

Read Dec. 22, 1757.

I Deferred to give an account of my obfervations upon the Comet that hath lately appeared, till I could fettle the places of the ftars with which it had been compared; feveral of them not being inferted in the Britifh catalogue, and thofe which are, requiring fome fmall corrections, which I have fince made from my own obfervations.

When I firft difcovered this Comet, it appeared to the naked eye like a dull ftar of the 5th or 6th magnitude; but viewing it thro' a feven-foot Telefcope, I could perceive a fmall Nucleus (furrounded, as ufual, with a nebulous atmofphere), and a fhort tail extended in a direction oppofite to the fun.

Some fmall ftars then appearing in the field of the telefcope with the Comet, I meafured its diftance from them with a Micrometer; and on September 12^d at 16^h 2' mean time, I found it to be 1° 13' 5" diftant from a fmall ftar, whofe right afcenfion was afterwards found to be 89° 49' 40" and declination 36° 11' 30" north: and near the fame time the Comet was obferved to be 43' 10" from another ftar, whofe right afcenfion was 90° 20' 0" and declination 35° 12' 0" north.

Hence

Hence I collected, that the Comet's right afcenfion was 89° 29′ 10″ and its declination 35° 0′ 20″ north.

September 13ᵈ 12ʰ 37′ mean time (which is likewife made ufe of in the following obfervations), the Comet had the fame right afcenfion with a fmall ftar, whofe right afcenfion was 93° 5′ 30″ and declination 34° 36′ 40″ north; and it was about two minutes more northerly than the ftar. Hence the Comet's right afcenfion was 93° 5′ 30″ and its declination 34° 38′ 40″ north.

September 14ᵈ 14ʰ 0′ the Comet preceded θ Geminorum 1° 31′ 35″ in right afcenfion, and was 11′ 35″ more foutherly. The apparent right afcenfion of θ Geminorum was then 99° 11′ 40″ and its declination 34° 13′ 25″ north. Hence the right afcenfion of the Comet was 97° 40′ 5″ and its declination 34° 1′ 50″ north.

Sept. 17ᵈ 13ʰ 0′ a fmall ftar (whofe right afcenfion was 109° 55′ 20″ and declination 31° 27′ 40″) preceded the Comet 47′ 10″ in right afcenfion, and was 12′ 30″ more northerly. Hence the Comet's right afcenfion was 110° 42′ 40″ and its declination 31° 15′ 10″ north.

Sept. 19ᵈ 15ʰ 17′ a ftar (whofe right afcenfion was 118° 29′ 40″ and declination 28° 9′ 45″) preceded the Comet 1° 14′ 0″ in right afcenfion, and was more foutherly 15′ 45″. Hence the Comet's right afcenfion was 119° 43′ 40″ and declination 28° 25′ 30″ north.

Sept. 23ᵈ 15ʰ 57′ a ftar (whofe right afcenfion was 134° 55′ 45″ and declination 22° 15′ 55″ north) preceded the Comet 12′ 30″ in right afcenfion, and

was 29′ 0″ more northerly. Hence the Comet's right afcenfion was 135° 8′ 15″ and its declination 21° 46′ 55″ north.

Sept. 24ᵈ 15ʰ 21′ the Comet had the fame declination with a fmall ftar that preceded it 10′ 15″ in right afcenfion. This ftar's right afcenfion was afterwards found to be 138° 13′ 45″ and its declination 20° 5′ 20″. Hence the Comet's right afcenfion was 138° 24′ 0″ and its declination 20° 5′ 20″ north.

Sept. 28ᵈ 16ʰ 22′ the Comet followed Regulus 1° 7′ 12″ in right afcenfion, and was 14′ 45″ more northerly. The right afcenfion of Regulus being then 148° 51′ 13″ and its declination 13° 8′ 35″ north; the Comet's right afcenfion was 149° 58′ 25″ and its declination 13° 23′ 20″ north.

Sept. 30ᵈ 16ʰ 24′ ρ Leonis (whofe right afcenfion was 155° 0′ 10″ and declination 10° 32′ 53″ north) followed the Comet 18′ 45″ in right afcenfion, and was 7′ 53″ more northerly. Hence the Comet's right afcenfion was 154° 41′ 25″ and its declination 10° 25′ 0″ north.

October 2ᵈ 16ʰ 48′ the 37th ftar Sextantif. Hevel. in the Britifh Catalogue (whofe right afcenfion was 158° 21′ 25″ and declination 7° 38′ 40″ north) preceded the Comet 32′ 50″ in right afcenfion, and was 3′ 20″ more foutherly. Hence the Comet's right afcenfion was 158° 54′ 15″ and its declination 7° 42′ 0″ north.

October 3ᵈ 16ʰ 45′ c Leonis (whofe right afcenfion was 162° 2′ 15′ and declination 7° 24′ 0″ north) followed the Comet 1° 12′ 55″ in right afcenfion, and was 56′ 40″ more northerly. Hence the Comet's right afcenfion was 160° 49′ 20″ and its declination 6° 27′ 20″ north.

October 4ᵈ 17ʰ 0' *d* Leonis (whofe right afcenfion was 162° 0' 15" and declination 4° 54' 57" north) preceded the Comet 40' 15" in right afcenfion, and was more foutherly 20' 53". Hence the Comet's right afcenfion was 162° 40' 30" and its declination 5° 15' 50" north.

October 7ᵈ 16ʰ 54' the 79th Leonis in the Britifh Catalogue (whofe right afcenfion was 167° 53' 37" and declination 2° 44' 15" north) followed the Comet 13' 0" in right afcenfion, and was more northerly 38' 35". Hence the Comet's right afcenfion was 167° 40' 37" and its declination 2° 5' 40" north.

October 8ᵈ 16ʰ 53' the Comet preceded *v* Leonis 1° 53' 30" in right afcenfion, and was 37' 20" more northerly. The right afcenfion of this ftar was 171° 7' 45" and its declination 0° 30' 55" north; therefore the Comet's right afcenfion was 169° 14' 15" and its declination 1° 8' 15" north.

October 11ᵈ 16ʰ 52' the Comet followed *v* Leonis 2° 33' 30" in right afcenfion, and appeared 1° 55' 5" more foutherly; but it being near the horizon, the difference of right afcenfion muft have been con-tracted by refraction about 1' 5", and the difference of declination about 1' 30": fo that the corrected right afcenfion of the Comet was 173° 42' 20" and its declination 1° 25' 40" fouth.

Immediately after this obfervation a fog arofe, which prevented me from repeating it; and feveral mornings following proving hazy or cloudy, I could not fee the Comet again till October 18th, about an hour and a quarter before fun-rifing; when the twi-light being ftrong, and the Comet low, it appeared very faint. However, I was unwilling to omit the

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opportunity of determining its place, as near as I could, by a fingle obfervation, in the following manner.

At 6^h 59' 54" ¼ fidereal time, I obferved the paffage of the Comet over the perpendicular wire of my equatorial Sector; then leaving the inftrument in the fame pofition till the next evening, I obferved, that at 22^h 8' 15" fidereal time, the 17th ftar of Eridanus in the Britifh Catalogue paffed over the fame wire (or horary circle) 9' 30" more foutherly than the Comet. And at 23^h 45' 36" fidereal time the ftar marked b in Eridanus paffed, 19' 55" more northerly than the Comet.

I found that the fituation of my inftrument was not fenfibly altered between the 18th and 19th of October; for the tranfits and the difference of declination of the fame ftars being obferved with it again on the 19th of October, they agreed very well with thofe that were taken the preceding night. It may therefore be fuppofed, that the pofition of the inftrument continued the fame likewife during the time of the foregoing obfervations.

The right afcenfion of the 17th ftar of Eridanus being 49° 39' 10" and its declination 5° 55' 25" fouth; and the right afcenfion of b of Eridanus being 73° 59' 25" and its declination 5° 25' 10" fouth; I collected, that when the Comet paffed the wire (or horary circle) which was October 17^d 17^h 12' mean time, its right afcenfion was 182° 34' 0" and its declination 5° 45' 35" fouth.

The laft time that I faw the Comet was on the 19th of October in the morning; but it then appeared fo faint, that I could not obferve its place. Its elongation from the fun was then but about 20

degrees;

degrees; and from that day to the prefent it hath always been lefs; which is the principal reafon why it was invifible to us at the time when it was in its perihelion, and hath remained fo ever fince. The elongation will indeed foon become greater, and yet it is probable that we fhall not be able to fee the Comet again; becaufe its real diftance from the fun will be greater than it was when I firft faw it, and it will be alfo four times further from us than it was at that time.

The Comet kept nearly at the fame diftance from the earth for ten or twelve days together after I firft faw it; but its brightnefs gradually increafed then, becaufe it was going nearer to the fun. Afterwards, when its diftance from the earth increafed, altho' it continued to approach the fun, yet its luftre never much exceeded that of ftars of the fecond magnitude, and the tail was fcarce to be difcerned by the naked eye.

All the forementioned obfervations were made with a Micrometer in a feven-foot Tube, excepting thofe of the 3d, 11th, and 17th days of October, which were taken with a curious Sector conftructed for fuch purpofes by the late ingenious Mr. George Graham; of which Dr. Smith has given a very exact defcription in his third book of Optics.

Suppofing the Trajectory of this Comet to be parabolic, I collected from the foregoing obfervations, that its motion round the fun is *direct*, and that it was in its *perihelion* October the 21ft, at 7^h $55'$ mean (or equated) time at Greenwich. That the inclination of the plane of its Trajectory to the ecliptic is $12°$ $50'$ $20''$; the place of the defcending Node ♉ $4°$ $12'$

12′ 50″; the place of the Perihelion ♌ 2° 58′ 0″; the diſtance of the Perihelion from the deſcending Node 88° 45′ 10″; the Logarithm of the Perihelion diſtance 9.528328 ; the Logarithm of the diurnal motion 0.667636.

From theſe Elements (which are adapted to Dr. Halley's general Table for the Motion of Comets in parabolic Orbits), I computed the places of this Comet for the reſpective times of the foregoing obſervations, as in the following table; which contains likewiſe the longitudes and latitudes deduced from the obſerved right aſcenſions and declinations, and alſo the differences between the computed and obſerved places. Theſe differences (no-where exceeding 40″) ſhew, that the elements here ſet down will be ſufficient to enable future aſtronomers to diſtinguiſh this Comet upon another return; but as they do not correſpond with the elements of the orbit of any other Comet hitherto taken notice of, we cannot determine at preſent the period thereof.

Greenwich,.

Greenwich, 1757. Mean Time.			Comet. Long. Observ.				Latit. Observ.				Long. Comp.				Latit. Comput.				Diff. Long.		Diff. Latit.	
d.	h.	'	S.	°	'	"		°	'	"	S.	°	'	"		°	'	"		'	"	'	"
Sept. 12	16	2	II	29	34	13		11	32	16 No.	II	29	34	11		11	32	20 No.		− 2		+ 4
13	12	37	♋	2	35	34		11	12	13	♋	2	35	47		11	12	11		+ 13		− 2
14	14	0		6	27	45		10	44	3		6	27	42		10	43	43		− 3		− 20
17	13	0		17	49	40		9	3	30		17	50	16		9	3	11		+ 36		− 20
19	15	17		26	6	8		7	36	49		26	5	50		7	36	30		− 18		− 19
23	15	57		11	19	18		4	33	38		11	19	4		4	33	32		− 14		− 6
24	15	21	Ω	14	44	19		3	49	37 No.	Ω	14	44	3		3	49	39 No.		− 16		+ 2
28	16	22		27	23	43		1	3	44 No.		27	23	32		1	3	52 No.		− 11		+ 8
30	16	24	♍	2	45	43		0	5	30 So.	♍	2	45	39		0	5	17 So.		− 4		− 13
Octob. 2	16	48		7	37	43		1	5	50		7	37	42		1	5	32		− 1		− 18
3	16	45		9	51	36		1	32	22		9	51	29		1	31	55		− 7		− 27
4	17	0		12	1	4		1	56	42		12	0	25		1	56	23		− 39		− 19
7	16	54		17	51	3		2	56	48		17	51	6		2	56	24		+ 3		− 24
8	16	53		19	39	45		3	13	7		19	39	33		3	12	28		+ 12		+ 39
11	16	52		24	47	22		3	48	49		24	47	47		3	49	29		+ 25		+ 40
17	17	12	♎	4	38	58		4	15	42 So.	♎	4	38	36		4	15	2 So.		− 22		− 40